

A NEW SPECIES OF *ISCHNOCHITON* (*CHARTOPLAX*) IREDALE & HULL, 1924
(MOLLUSCA: POLYPLACOPHORA) FROM SOUTH AUSTRALIA, AND THE
STATUS OF *ISCHNOCHITON* (*STENOCHITON*) *PALLENS* ASHBY, 1900

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Ischnochiton (*Chartoplax*) Iredale & Hull, 1924 is redefined, mainly on the basis of characteristic girdle and radular morphology. The new species *I. (Chartoplax) nubilis* is described and compared with the type and only other known species of the subgenus, *I. (C.) purus* Sykes, 1896. *Ischnochiton* (*Stenochiton*) *pallens* Ashby, 1900 is a junior subjective synonym of *I. (C.) purus*.

THE ENDEMIC southern Australian polyplacophoran genus *Stenochiton* H. Adams & Angas, 1864, hitherto represented by four species, belongs to the family Ischnochitonidae (Iredale & Hull 1924, 1927; Cotton & Godfrey 1940; Cotton 1964). During a recent study of the Ischnochitonidae from this region, it was recognized that the type specimens of one of the species previously assigned to this genus, *Ischnochiton* (*Stenochiton*) *pallens* Ashby, 1900, actually represent two species, both of which belong to *Ischnochiton* Gray, 1847. Both species are here assigned to *Ischnochiton* (*Chartoplax*) Iredale & Hull, 1924, and one of the species, also represented by additional material from South Australia, is newly named.

All material examined is deposited in the Museum of Victoria, Melbourne (NMV) and the South Australian Museum, Adelaide (SAM). Registration numbers and measurements of all specimens used in this study are on file in the Department of Invertebrate Zoology, NMV. The methodologies for obtaining morphometric and meristic measurements, and scanning electron microscope (SEM) preparations, are described by Cochran (1988). Terminology for morphology of valves follows that of Kaas & Van Belle (1985).

SYSTEMATICS

Family ISCHNOCHITONIDAE Dall, 1889
Subfamily ISCHNOCHITONINAE Dall, 1889

Genus *Ischnochiton* Gray, 1847
Subgenus *Ischnochiton* (*Chartoplax*)
Iredale & Hull, 1924

Haploplax (*Chartoplax*) Iredale & Hull 1924: 295.

Type species. *Ischnochiton* (*Haploplax*) *pura* [sic] Sykes, 1896.

Diagnosis. *Ischnochiton* of small size (to 22 mm long), elongate to elongate-ovate, round-backed or carinated with moderately high dorsal elevation. Surface of tegmentum ridged with shallow grooves connecting apical caps of aesthetes; ridges longitudinally-arranged on central and antemucronal areas, radially-arranged on terminal (postmucronal area and anterior valve) and lateral areas of valves; granules and pits may be present. Insertion teeth of intermediate valves with 1–3 slits. Dorsal girdle scales minute (to 60 µm wide), elongated, dorso-ventrally flattened or slightly convex, and striated with narrow ridges which do not extend to distal margin of scales. Ventral girdle scales smooth or striated. Central teeth of radula broad, hardly folded; blade of first lateral teeth laterally curved, broad, not folded; major lateral teeth bicuspidate, cusps almost equal in size, with dorsal hump or angularity; spatulate uncinial teeth with shallow groove or with thickened edge and no groove.

Remarks. Iredale & Hull (1924) proposed *Haploplax* (*Chartoplax*) for *Ischnochiton* (*Haploplax*) *purus*, which they separated from other species of *Haploplax* on the basis of its

Character	<i>I. (Ischnochiton)</i>	<i>I. (Chartoplax)</i>	<i>I. (Haploplax)</i>
Radula			
(a) Denticle cap of major lateral teeth			
(i) size of eusps	approximately equal	approximately equal	inner eusp much longer and larger than outer eusp
(ii) dorsal surface	rounded	angular/humped	rounded
(b) First lateral teeth	blade folded, restricted to apex of teeth	blade not folded, laterally curved	blade folded, enlarged to extend down outer edge of teeth
Dorsal girdle scales			
(a) distal margin	rounded or obtusely pointed	flattened	obtusely pointed
(b) shape	convex	flattened	convex
(c) striae	distinct; extend to margin; grooves and ridges of approximately equal size	distinct; do not extend to margin; ridges thin, grooves wide and deep	indistinct; extend to margin; grooves and ridges of approximately equal size

Table 1. Comparison of selected characters of *I. (Ischnochiton)*, *I. (Chartoplax)* and *I. (Haploplax)*.

small, elongate, smooth and flattened girdle scales. More recent authors (eg. Kaas & Van Belle 1980, 1987) have not recognised *Chartoplax* but have assigned *purus* either to *Ischnochiton* or to *Ischnochiton (Haploplax)*. I consider, however, that the girdle and radula of *purus* and the new species *nubilus* differ sufficiently from those of species assigned to *I. (Ischnochiton)* and *I. (Haploplax)* to justify subgeneric distinction (Table 1). I therefore recognize *Chartoplax* as a subgenus of *Ischnochiton* to accommodate these two species.

Ischnochiton (Chartoplax) purus Sykes, 1896

Ischnochiton (Stenochiton) pallens Ashby 1900 (in part): 86–87, pl. 1, fig. 1B–E (non pl. 1, fig. 1).

Remarks. The type material of *Ischnochiton (Stenochiton) pallens* consists of two specimens, SAM D978 (Ashby 1900, pl. 1, fig. 1B–E) and SAM D11728 (Ashby 1900, pl. 1, fig. 1). In his original description Ashby did not designate a holotype, and although he labelled the specimens “type” and “co-type” respectively, this action does not constitute a valid type designation (ICZN Article 72(b)(vii)). The specimens were incorrectly referred to by Zeidler & Gowlett (1986) as the holotype (SAM D978) and paratype (SAM D11728), following Cotton & Godfrey (1940) and Cotton (1964). The citing of SAM D978 as holotype by Cotton & Godfrey (1940) constitutes a valid designation of lectotype (ICZN Article 74(a); also “designation of

lectotype by inference of holotype”, ICZN Article 74(b)).

Ashby’s illustrations of the lectotype show wide, shallow insertion slits and a jugal notch in the anterior valve, a wide, rounded posterior valve and flattened apophyses, and granulose tegmental sculpture. In these features, and in the rectangular shape of most of the intermediate valves in dorsal view, the specimen resembles *Ischnochiton (Chartoplax) purus*, and *pallens* is here considered to be a junior subjective synonym of that species. The trapezoidal shape of the intermediate valve of the lectotype of *pallens* shown in pl. 1, fig. 1 of Ashby (1900) superficially resembles an intermediate valve of *I. (C.) nubilus* sp. nov., but the figured valve is valve II which is commonly this shape in species of *Ischnochiton*. The posterior valve of the lectotype of *pallens* figured by Ashby has been lost (Zeidler & Gowlett 1986, as holotype).

The paralectotype of *pallens* differs from the lectotype in a number of characters (see below) and is here considered to belong to a separate, hitherto unnamed species. The specimen is selected as the holotype of *I. (C.) nubilus* sp. nov.

In a later discussion of *pallens*, Ashby (1918) referred to “the three original specimens dredged by Dr J. C. Verco”, thus implying the existence of a third type specimen. The third specimen to which he was referring (SAM D14491) was, according to the original label, dredged in Spencer Gulf in February 1905, five

years after the publication of the original description of *I. (S.) pallens*. This specimen is thus not considered to have any type status.

When *I. (Stenochiton) pallens* was originally described, the geographic range of *I. (Chartoplax) purus* was not known to extend as far west as South Australia. The intermediate valves of *I. (C.) purus* were also considered to contain one slit (Sykes 1896; Iredale & Hull 1924, 1927), whereas I have found that there are as many as three slits. The presence of two slits in two of the intermediate valves of the lectotype of *I. (S.) pallens* probably led Ashby (1900) to assign his species to *Stenochiton*, because the two representatives of that genus known at the time (*S. longicymba* and *S. pilsbryanus*) have multifissurate intermediate valves. The morphological similarities between *I. (C.) purus* and *I. (C.) nubilus* sp. nov., together with the paucity of information on both species, probably led to their inclusion in *I. (S.) pallens* by Ashby.

Ischnochiton (Chartoplax) nubilus sp. nov.

Figs 1, 2

Ischnochiton (Stenochiton) pallens Ashby 1900 (in part): 86–87, pl. 1, fig. 1 (non pl. 1, fig. 1B–E).—Nierstrasz 1905: 19.—Zeidler & Gowlett 1986: 108.

Ischnochiton pallens.—Iredale 1910: 158.

non *Ischnochiton pallens*.—Torr 1912: 143.—Gatliff & Gabriel 1917: 26–27 [= *Stenochiton cymodocealis* Ashby, 1918].—Ashby 1926: 15, pl. 1, fig 1 [= *Ischnochiton lineolatus* (Blainville, 1825)].

Stenochiton pallens.—Ashby 1918: 75–76, pl. 14, figs 14A, B.—Ashby 1923: 263.—Iredale & Hull 1924: 287–288, pl. 37, fig 8.—Ashby 1927: 116.—Iredale & Hull 1927: 32, pl. 5, fig 8.—Cotton & Godfrey 1940: 511, fig 504.—Cotton 1964: 50, fig 49.—Zeidler & Gowlett 1985: 37.

non *Stenochiton pallens*.—Ashby 1920: 284.—Ashby 1921: 150–151.—Gatliff & Gabriel 1931: 219 [= *S. cymodocealis* Ashby, 1918].

Etymology. The specific name (*L. nubilus* = cloudy, covered with clouds) refers to the colour pattern on the tegmentum.

Type material. Holotype: SAM D11728 (paralectotype of *Ischnochiton (Stenochiton) pallens*), from Gulf St Vincent, South Australia (SA); dredged by J. C. Verco, ex Ashby collection. Dried, curled specimen measuring approximately 16 × 6 mm. Paratypes: SAM D17592 (1 preserved specimen), Reevesby Island, and SAM D17593 (1 partially disarticulated preserved specimen), Marum Island, northern and north-western points, both islands in Sir Joseph Banks Group, Speneer Gulf, SA; SAM D15127 (1 dried specimen), Brighton, SA; NMV F54266 (1 preserved specimen), Point Sinclair, SA.

Other material examined. SAM D14491 (1 dried specimen), Speneer Gulf, SA; SAM D17594–D17598 (7 preserved specimens), Marum Island, Speneer Gulf, SA; SAM D14928 (1 dried specimen), Brighton, SA; NMV F52986 (1 dried specimen), off Cape Donington, SA.

Diagnosis. Animal elongated (total length:total width > 2.5:1), round-backed. Surface of tegmentum glossy, finely ridged; insertion teeth adjacent to posterior edge of anterior and intermediate valves triangular in shape; intermediate valves with 1–2 slits; dorsal girdle scales almost rectangular, glossy, striated with 7–12 narrow ridges having wide, deep grooves between them.

Description

General. Specimens to 22 mm long, elongated, with an average total length:total width ratio of $2.59 \pm 0.26:1$ (mean \pm sd, $n = 14$ (Fig. 1A, B); round-backed (Fig. 1M), with a moderate to high dorsal elevation (height:width ratio of valve V) of $0.40 \pm 0.09:1$, $n = 14$.

Tegmentum. Colour fawn or cream, mottled with pale pink, pale brown and mauve; dark red-brown markings also present on some specimens; tegmentum glossy, microscopically sculptured with very fine ridges, with smooth polished appearance under low magnification. Apical caps of megal aesthetes approximately three times size of subsidiary caps (Fig. 2A).

Valves. Anterior valve (Fig. 1C, I) broad, more than twice as wide as long (width:length ratio of valve I = $2.08 \pm 0.13:1$, $n = 14$); slope slightly convex, posterior margin widely V-shaped to U-shaped. Intermediate valves (Fig. 1D, J) trapezoid in dorsal view, relatively long (width:length ratio of valve V = $2.23 \pm 0.35:1$, $n = 13$); posterior margin straight, lateral areas slightly raised. Posterior valve (Fig. 1E, K) elongated (width:length ratio of valve VIII = $1.09 \pm 0.08:1$, $n = 13$), tapering posteriorly; muero sub-median (ratio of distance between anterior margin and muero:total length of valve VIII = $0.59 \pm 0.04:1$, $n = 13$), pointed and slightly raised; diagonal line straight to slightly concave, forming an equilateral triangle with anterior margin; dorsal surface of antemuero area typically slightly convex (Fig. 1K) but in some specimens slightly concave adjacent to muero (Fig. 1K'); postmuero slope usually convex immediately below muero and becoming concave near base of valve, but in some specimens totally concave.

Articulamentum. White with red-brown markings in muscle sears; apophyses small, tapering

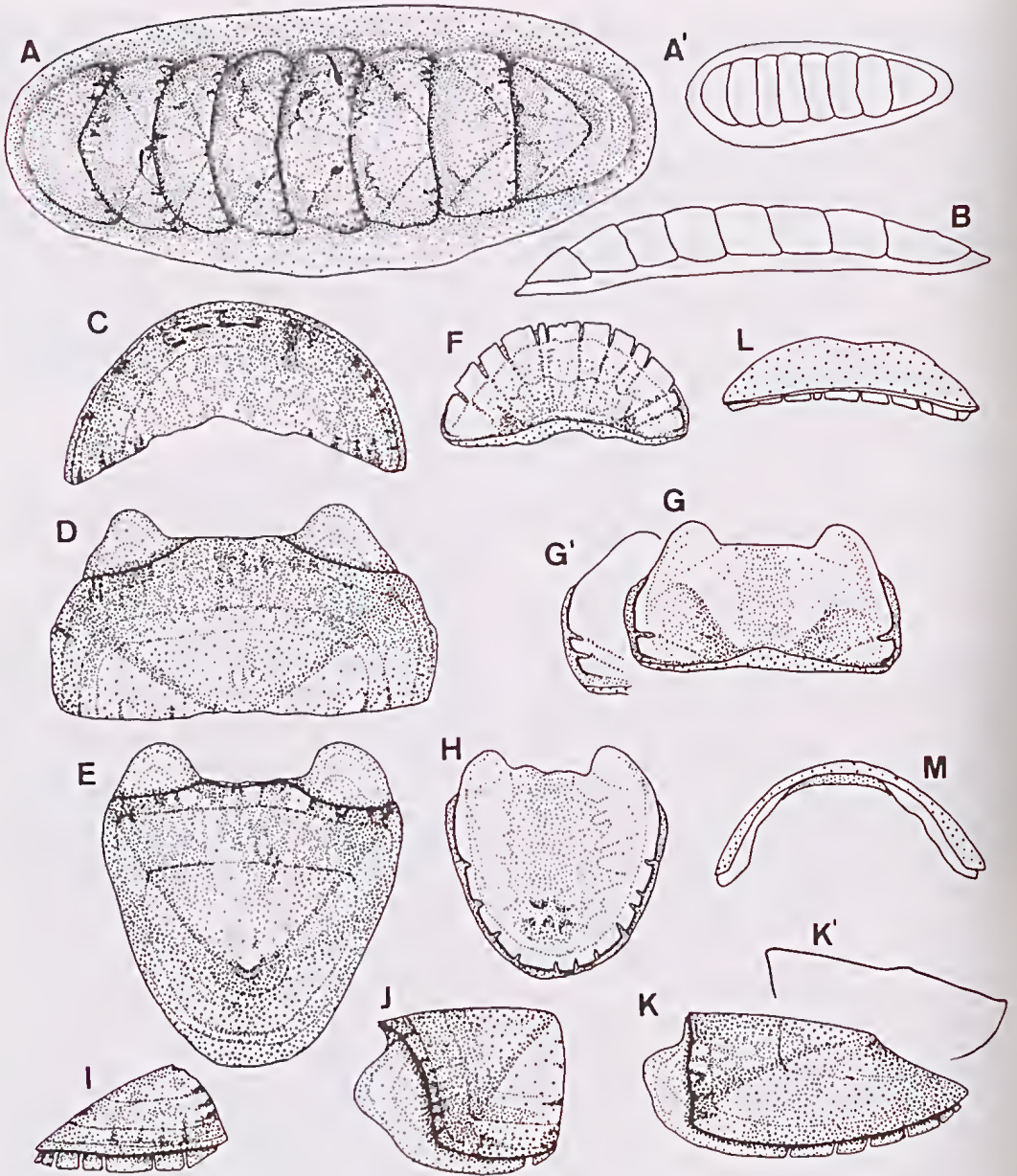


Fig. 1. *Ischnochiton nubilus* sp. nov. A-B, whole specimen. A, dorsal view, $\times 6.5$; A', dorsal view showing posterior tapering, $\times 2.4$; B, lateral view, $\times 4.7$. C-E, dorsal view of valves, $\times 3.5$. C, valve I; D, valve V; E, valve VIII. F-H, ventral view of valves, $\times 2.5$. F, valve I; G, valve V; G', valve VII; H, valve VIII. I-K, lateral view of valves, $\times 3.5$. I, valve I; J, valve V; K, K', valve VIII from two different specimens. L, M, anterior view of valves, $\times 2.5$. L, valve I; M, valve V. A-B, paratype SAM DI5127; A', C-M, paratype SAM DI7593; K', paratype SAM DI7592.

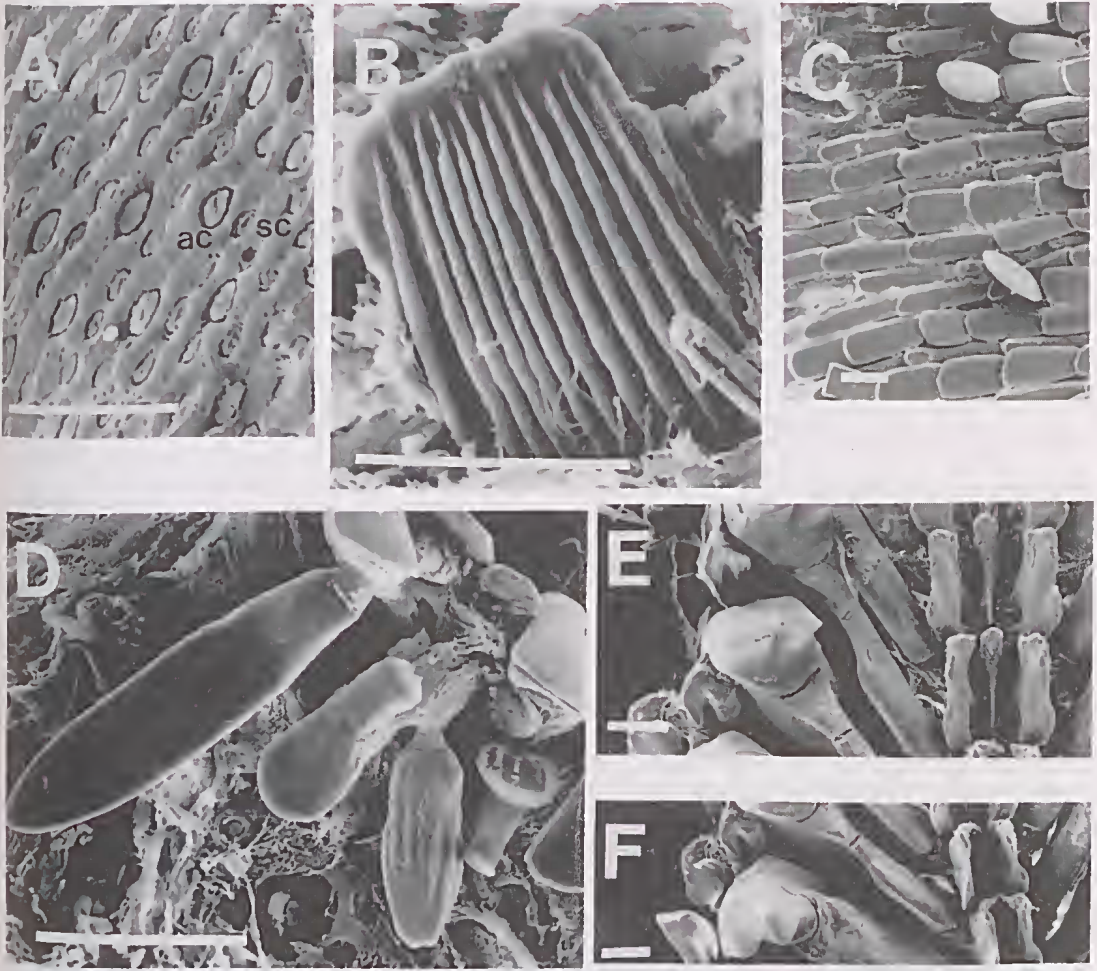


Fig. 2. *Ischnochiton nubilus* sp. nov., paratype SAM D17593. A, tegmentum showing apical caps (AC) and subsidiary caps (SC) of aesthetes, connected by longitudinal grooves. B, dorsal girdle scale. C, ventral girdle scale. D, marginal scales. E, F, radula. Scale bars: A, C-F = 50 μ m; B = 25 μ m).

with an outer lateral flange (Fig. 1D); apophyses connected across jugal sinus by a narrow shelf in posterior valve (Fig. 1E); jugal sinus wide, more than one-third width of valve (ratio of jugal sinus:apophysis width = $0.43 \pm 0.12:1$, $n=4$) (Fig. 1D, G); insertion teeth project beyond edge of tegmentum in anterior valve (Fig. 1F, I); teeth adjacent to posterior margin of anterior and intermediate valves tapered posteriorly, triangular (Fig. 1I, J); slits narrow, longer in anterior and intermediate valves ($400 \mu\text{m}$ long \times $40 \mu\text{m}$ wide) than in posterior valve ($200 \times 40 \mu\text{m}$) (Fig. 1F-H, L); slit formula 9-13/1-2/9-12; valves II-V with one slit; valve VII with two slits

(Fig. 1G'); valve VI with typically one slit, but two in some specimens.

Girdle. Width of girdle $14.94 \pm 3.02\%$ ($n=10$) of total width of spirit-preserved specimens, in some specimens wider anteriorly, giving animal a posteriorly-tapered appearance (Fig. 1A'); girdle white, or fawn with red-brown markings. Dorsal scales minute ($20-50 \mu\text{m}$ wide), rectangular, with a tendency to stand upright on girdle; scales of uniform size throughout girdle, glossy, microscopically striated with 7-12 deep grooves (Fig. 2B); ventral scales glossy, oval to rectangular, dorso-ventrally flattened, blunt-ended, $50-75 \times 20-30 \mu\text{m}$ in size (Fig. 2C); mar-

ginal spicules straight, pointed, $100 \times 25 \mu\text{m}$ in size, interspersed with blunt-tipped, irregularly-shaped scales striated with 4–5 longitudinal ridges (Fig. 2D).

Gills. 19–25 pairs of long, narrow ctenidia extending from level of posterior margin of valve III; nephridiopore and gonopore separated by two ctenidia, situated typically between gills 6–7 and 8–9 respectively.

Radula (Fig. 2E, F). Central tooth narrow, elongated, apically broader and rounded; first lateral teeth broad, flattened, blade laterally curved, not folded, oriented parallel to central tooth, inner surface concave at base; major lateral teeth with obtusely-pointed, bidentate cusps, with dorsal angularity; spatulate uncinal teeth with shallow dorsal groove.

Distribution and habitat. From Point Sinclair ($32^{\circ}06'S$, $132^{\circ}58'E$) to Gulf St Vincent ($34^{\circ}10' - 35^{\circ}10'S$, $137^{\circ}45' - 138^{\circ}30'E$) in South Australia. Records of *I. (C.) nubilis* (as *I. (Stenochiton) pallens*) from Port Phillip Bay, Victoria (Gatliff & Gabriel 1917, 1931; Ashby 1918) are based on the misidentification of a single, badly damaged specimen of *Stenochiton cymodocealis* Ashby 1918 (NMV F54480); the girdle scales are smooth, apically-rounded and characteristic of the latter species (Fig. 3B). The dorsal girdle scales of *I. (C.) nubilis* are rectangular and striated (Fig. 2B).

Ischnochiton (Chartoplax) nubilis lives on pebbles in sand, or amongst rubble or the sea-

grass *Posidonia* (Zeidler & Gowlett 1985), at depths of up to 18 m.

Remarks. Although the new species superficially resembles members of *Stenochiton*, it is placed in *Ischnochiton* on the basis of the morphology of valves, girdle scales and radula. The finely-ridged tegmental sculpture, the morphology of the aesthetes (Fig. 2A) and the striated dorsal girdle scales (Fig. 2B) are characteristic of *Ischnochiton*. The tegmentum and dorsal girdle scales of *Stenochiton* are smooth (Fig. 3A, B). *I. (C.) nubilis* can be readily separated from species of *Stenoplax* Dall, 1879 by the bicuspidate denticle cap of the radula (Figs 2E, F); in *Stenoplax* this structure is tricuspidate (Bullock 1985).

I. (C.) nubilis shares several morphological characters with *I. purus*, with which it is sympatric in South Australia. The two species may be distinguished by the features listed in Table 2.

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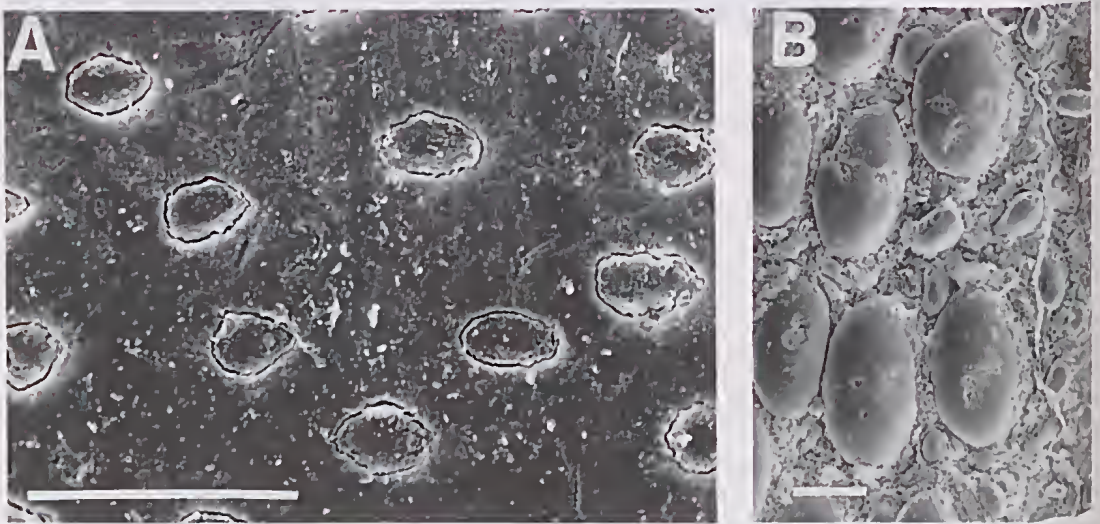


Fig. 3. *Stenochiton cymodocealis* Ashby, NMV F51423. A, tegmentum showing aesthete caps. B, dorsal girdle scales. Scale bars = $50 \mu\text{m}$.

Character	<i>I. (C.) nubilus</i>	<i>I. (C.) purus</i>
Colour of tegmentum	cream/fawn mottled with pink, pale brown and mauve	white/cream
Tegmental sculpture	granules/pits absent	granules/pits present
Shape of valves III-VII (dorsal view)	trapezoid	rectangular
Shape of intermediate valves (anterior view)	round-backed	carinated
Morphology/size of insertion slits (anterior valve)	long, narrow 400 × 40 µm	wide, U-shaped 360 × 120 µm
Edge of insertion teeth	straight, sharp	crenulated
Shape of insertion teeth adjacent to posterior margin of anterior and intermediate valves	tapered posteriorly (triangular)	not tapered (rectangular)
Number of striae on dorsal girdle scales	7-12	12-16
Ventral girdle scales	smooth	striated
Typical positions of nephridiophore and gonopore, respectively	6 & 7/8 & 9 (separated by two ctenidia)	5 & 6/6 & 7 (separated by one ctenidium)

Table 2. Comparison of selected characters of *Ischnochiton* (*Chartoplax*) *nubilus* sp. nov. and *I. (C.) purus*.

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